

## Administrative Master Syllabus

### Course Information

<b>Course Title</b>	Organic Chemistry II
<b>Course Prefix, Num. and Title</b>	CHEM 2425
<b>Division</b>	Math & Physical Sciences
<b>Department</b>	Chemistry
<b>Course Type</b>	Academic General Education Course (from ACGM, but not WCJC Core)
<b>Course Catalog Description</b>	Continuation of CHEM 2423. Advanced principles of organic chemistry will be studied, including the structure, bonding, properties, and reactivity of aliphatic and aromatic organic molecules, and properties and behavior of organic compounds and their derivatives. Emphasis is placed on organic synthesis and mechanisms. Topics include the study of covalent and ionic bonding, nomenclature, stereochemistry, structure and reactivity, reaction mechanisms, functional groups, and synthesis of simple molecules. Laboratory activities will reinforce these principles. This course is intended for students in science or pre-professional programs
<b>Pre-Requisites</b>	Chemistry 2423 with a grade of "C" or better
<b>Co-Requisites</b>	None

### Semester Credit Hours

<b>Total Semester Credit Hours (SCH): Lecture Hours:</b>	4:3:4
<b>Lab/Other Hours</b>	
<b>Equated Pay Hours</b>	5.4
<b>Lab/Other Hours Breakdown: Lab Hours</b>	4
<b>Lab/Other Hours Breakdown: Clinical Hours</b>	0
<b>Lab/Other Hours Breakdown: Practicum Hours</b>	0
<b>Other Hours Breakdown</b>	0

### Approval Signatures

Title	Signature	Date
<b>Department Head:</b>	<i>Rocio Doherty</i>	11/28/23
<b>Division Chair:</b>		12-4-2023
<b>VPI:</b>		

## Additional Course Information

**Topical Outline:** Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, and clinical or other non-lecture instruction).

Lecture Outline:

1. Review of Organic Chemistry I
2. Chemical Reactivity and Mechanisms (Thermodynamic)
3. Alcohols and Phenols
4. Ethers and Epoxides, Thiols and Sulfides.
5. Nuclear Magnetic Resonance (NMR) Spectroscopy.
6. Conjugated Pi Systems and Pericyclic Reactions.
7. Aromatic Compounds.
8. Aromatic Substitution Reactions.
9. Aldehydes and Ketones.
10. Carboxylic Acids and their Derivatives.
11. Alpha-Carbon Chemistry: Enols and Enolates.
12. Amines
13. Survey of Biomolecules: Carbohydrates, Amino acids, Peptides and Proteins, Nucleic Acids, and Lipids.
14. Synthetic Polymers

Laboratory Outline:

Syllabus, Introduction, and Safety

Lab Orientation/Keeping a Lab Notebook

1. Synthesizing Ethyl Acetate
2. Synthesis and Analysis of Aspirin (2 lab periods)
3. Synthesis of Dibenzalacetone by Aldol Condensation (2 lab periods)
4. Synthesis of Fluorescein
5. Analysis of Olive Oil by UV Spectroscopy
6. The Diels-Alder Reaction of Anthracene with Maleic Acid Anhydride
7. Final Project Session: Synthesis of Methyl Orange (3 lab periods)

## Course Learning Outcomes:

**Learning Outcomes – Upon successful completion of this course, students will:**

Lecture:

1. Correlate molecular structure with physical and chemical properties of aliphatic and aromatic organic molecules.
2. Predict the mechanism and outcome of aliphatic and aromatic substitution and elimination reactions, given the conditions and starting materials.
3. Predict the chirality of reaction products based on enantiomeric and diastereomeric relationships.
4. Describe reaction mechanisms in terms of energetics, reaction kinetics, and thermodynamics.
5. Use spectroscopic techniques to characterize organic molecules and subgroups.

Laboratory:

1. Perform chemical experiments, analysis procedures, and waste disposal in a safe and responsible manner.
2. Utilize scientific tools such as glassware and analytical instruments to collect and analyze data.
3. Identify and utilize appropriate separation techniques such as distillation, extraction, and chromatography to purify organic compounds.



- Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports.
- Correlate molecular structure with physical and chemical properties of aliphatic and aromatic organic molecules.
- Predict the mechanism and outcome of aliphatic and aromatic substitution and elimination reactions, given the conditions and starting materials.
- Predict the chirality of reaction products based on enantiomeric and diastereomeric relationships.
- Describe reaction mechanisms in terms of energetics, reaction kinetics, and thermodynamics.
- Use spectroscopic techniques to characterize organic molecules and subgroups.

**Methods of Assessment:**

Outcomes assessed by:

Class work, homework assignments, quizzes and/or exams, posters/graphs/charts, oral

Lab outcomes assessed by:

Data entries, lab reports, lab quizzes, homework assignments and/or lab final exam questions

**Required text(s), optional text(s) and/or materials to be supplied by the student:**

- Klein, David. Organic Chemistry. 4<sup>th</sup> Edition, by Wiley. (ISBN: 978-1-1197-6092-4)
- It is recommended to obtain a Molecular Model Kit for Organic Chemistry.
- Scientific calculator (with logarithms and exponent functions)
- Laboratory Notebook
- Labs are posted on Brightspace and must be printed prior to class.

**Suggested Course Maximum:**

Lecture: 24, Lab: 24

**List any specific or physical requirements beyond a typical classroom required to teach the course.**

Chemistry laboratory classroom required for the lab component.

**Course Requirements/Grading System:** Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course.

Lecture average:	Exam average (3-4 exams)	30-55%
	Other (homework, quizzes, projects)	0-25%
Lab average:	(based on lab average below)	25%
Final exam average:	(includes at least 50% comprehensive material)	20-25%
		100% total
Lab Average*:	Lab notebooks	20-75%
	Other (lab reports, exercises, quizzes)	25-80%
	Lab final	10-20%
		100% lab total

\*Department policy: A student must earn a 60% laboratory grade or greater to pass the course.

The overall course grade is assigned as specified by the college:

A = 90–100

B = 80–89

C = 70–79

D = 60–69

F = below 60

### **Curriculum Checklist:**

**Administrative General Education Course** (from ACGM, but not in WCJC Core) – No additional documents needed.

**Administrative WCJC Core Course** – Attach the Core Curriculum Review Forms

Critical Thinking

Communication

Empirical & Quantitative Skills

Teamwork

Social Responsibility

Personal Responsibility

**WECM Course** – If needed, revise the Program SCANS Matrix and Competencies Checklist